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TITLE: Metabolic and Biomechanical Measures of Gait Efficiency of Three Multi-Axial, Vertical Shock and Energy Storing Return Prosthetic Feet During Simple & Complex Mobility Activities

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14. ABSTRACT  The purpose of the study is to assess the performance of ten highly mobile transtibial amputees on an obstacle course and laboratory setting utilizing three different multi-function prosthetic feet (vertical shock, torsion control, multiaxial and energy storing). At this time, the study is still underway; therefore we do not have significant findings to report. The equipment to be used for metabolic and timing has been evaluated and tested, and performed satisfactorily.					
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## Table of Contents

	<u>Page</u>
Introduction.....	4
Body.....	4
Key Research Accomplishments.....	5
Reportable Outcomes.....	5
Conclusion.....	5
References.....	5
Appendices.....	5
Supporting Data.....	6

## **Introduction**

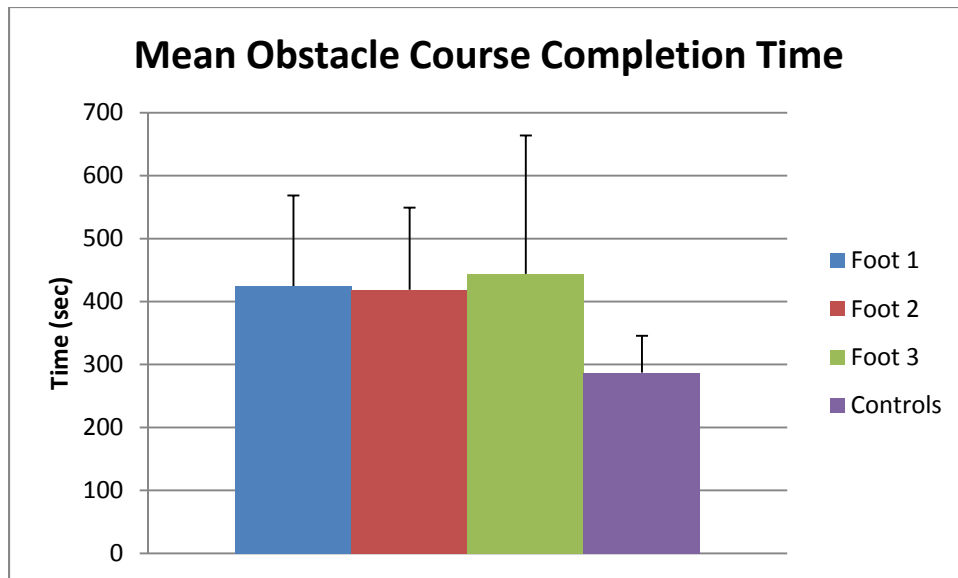
The purpose of the study is to assess the performance of 14 highly mobile transtibial amputees on an obstacle course and laboratory setting utilizing three different multi-function prosthetic feet (vertical shock, torsion control, multiaxial and energy storing). Subjects will be recruited based on a history of active military service, recent military service, active service as a first-responder or highly accomplished recreational/competitive amputee athlete. Amputee performance will also be compared to a non-amputee control group.

## **Body**

At this time we can report that 100% of experimental subjects completed data collection (n=14 transtibial amputees). Further, 100% of the control subjects completed data collection (n=14 SWAT team members; non-amputees). Said differently there was no attrition which is a significant accomplishment.

In terms of equipment for assessment, all equipment (i.e. Bertec treadmill, Vicon motion capture system, Cosmed Metabolic equipment, Brower timing system) has maintained sound operation throughout the data collection and there were no problems to report. Calibration was completed in accordance with manufacturer recommendations.

Enclosed is a preliminary bar graph demonstrating the overall mean(SD) time to complete the SWAT obstacle course. This is among the most salient outcome measures of the entire project. The blue, red and green bars represent the amputee performance in the 3 differing prosthetic feet conditions. Conditions have not yet been un-masked or statistically analyzed for significant differences (pending). Just observationally, it appears that there is the possibility of a performance compromise with foot condition #3 relative to feet conditions #1 and #2. Further, the more apparent difference is how much faster the SWAT team members (non-amputee controls) completed the course. In our opinion, at this preliminary stage of analysis it appears that this is the most likely significant difference (analysis underway). Observationally, it seems that regardless of prosthetic foot condition, there is an estimated 25% performance detriment associated with transtibial amputation regardless of foot condition, compared to non-amputee SWAT team control subjects when completing the SWAT obstacle course.



Data reduction is underway. Data analysis began late Fall 2013 and continues. Dissemination will follow, and will continue through the end of the no cost extension period, September 2014.

At this time, we do not foresee a need to revise any of the tasks approved in the original Statement of Work.

### Key Research Accomplishments

- The study experienced no attrition. Given that typical attrition in prosthetics studies is estimated at approximately 30%, we consider this an accomplishment.
- Comparative efficacy research of the interventions will add to the body of knowledge to facilitate informed clinical decision-making.

### Reportable Outcomes

At this time, there are no publications or presentations to report. The first manuscript is in development. The research team is considering expansion of this concept to other levels of amputation and have identified BAA W911QY-13-R-0032 as a potential granting mechanism for follow-up research.

### Conclusion

As stated in our anticipated results in the proposal, the expectation is to recommend a prosthetic foot that will optimize performance in rigorous activities such as those undertaken in this study.

### References

None

### Appendices

None

**Supporting Data**  
None